WE CLAIM:

1. A delivery system for a biologically active agent comprising:

a gemini surfactant in admixture with a biologically active agent in a topical formulation, wherein the delivery system, when in contact with the skin or mucosal membrane, releases the biologically active agent in a therapeutically-effective amount to provide a localized or systemic effect for treatment of a skin disorder or a metabolic disease.

2. The delivery system according to claim 1, wherein the gemini surfactant is selected from an anionic gemini surfactant, a gemini cationic surfactant, a neutral gemini surfactant, an amphoteric gemini surfactant, or mixtures thereof.

3. The delivery system according to claim 2, wherein the gemini surfactant is a gemini cationic surfactant.

4. The delivery system according to claim 3, wherein the gemini cationic surfactant is of a quaternary ammonium type.

5. The delivery system according to claim 4, wherein the gemini cationic surfactant has a hydrophobic tail comprising a C_3-C_{30} alkyl group, linear or branched, saturated or unsaturated.

6. The delivery system according to claim 1 or 5, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, protein, vaccine, immunoglobulin, immunomodulator, oligonucleotide, peptide, hormone; toxin, and enzyme.

7. The delivery system according to claim 6, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, and oligonucleotide.

8. The delivery system according to claim 7, wherein the biologically active agent is a plasmid DNA comprising the gene encoding for interferon-γ for treatment of scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

9. The delivery system according to claim 1 or 7, wherein the skin disorder is selected from the group consisting of scleroderma, atopic dermatitis, psoriasis, conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, an epidermal fragility disorder, a keratinization disorder, a hair disorder, a pigmentation disorder, a porphyria, a multisystem disorder, cancer, inherited epidermolysis bullosa;

lamellar ichthyosis, X-linked ichthyosis, and xeroderma pigmentosum.

10. The delivery system according to claim 9, wherein the skin disorder is selected from scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

11. The delivery system according to claim 1 or 7, wherein the metabolic disease is selected from the group consisting of conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, gyrate atrophy, maternal hyperphenylalaninemia, familial hypercholesterolemia, and phenylketonuria.

12. The delivery system according to claim 1 or 7, wherein the delivery system is provided in as a coating on, or filler in, a dressing, packing, film, mesh or transdermal patch, or in a pharmaceutical composition with one or more pharmaceutically acceptable carriers, diluents, excipients, or supplements suitable for application to the skin or mucosal membrane.

13. The delivery system according to claim 12, wherein the pharmaceutical composition is in the form of a cream, lotion, paste, ointment, foam, gel, lipid formulation, emulsion, or suspension, or a liquid formulated as an aqueous solution, non-aqueous solution, aerosol, mist, spray, drops, or instillation.

14. The delivery system according to claim 13, wherein the one or more supplements are selected from a neutral carrier or a permeation enhancer.

15. The delivery system according to claim 14, wherein the neutral carrier is selected from dioleyl phosphatidylethanolamine or cholesterol.

16. The delivery system according to claim 14, wherein the permeation enhancer is selected from ethanol, salicylic acid, diethylene glycol monoethyl ether, propylene glycol, oleic acid, a terpene, a surfactant, a fatty acid, a fatty acid ester, azone, an azone derivative, an amide, dimethylformamide, or a sulfoxide.

17. The delivery system according to claim 12, wherein the pharmaceutical composition further comprises one or more surfactants, co-surfactants, or oily phase components suitable for application to the skin or mucosal membrane.

18. The delivery system according to claim 17, wherein the surfactant is selected from the group consisting of PEG-8 caprylic and capric glycerids.

19. The delivery system according to claim 17, wherein the co-surfactant is selected from the group consisting of polyglyceryl 3- diisostearate, polyglyceryl-6 isostearate, polyglycerol-3-isosterate and polyglyceryl-6 dioleate.

20. The delivery system according to claim 17, wherein the oily phase component is selected from the group consisting of propylene glycol monocaprylate, oleoyl macrogol-6 glycerides, PEG-8 glyceryl linoleate, propylene glycol laurate, propylene glycol monolaurate, and octyldodecyl myristate.

21. A pharmaceutical composition in a topical formulation comprising:

the delivery system according to claim 1, in admixture with one or more pharmaceutically acceptable carriers, diluents, excipients, or supplements suitable for application to the skin or mucosal membrane.

22. The pharmaceutical composition according to claim 21, wherein the gemini surfactant is selected from an anionic gemini surfactant, a gemini cationic surfactant, a neutral gemini surfactant, an amphoteric gemini surfactant, or mixtures thereof.

23. The pharmaceutical composition according to claim 22, wherein the gemini surfactant is a gemini cationic surfactant.

24. The pharmaceutical composition according to claim 23, wherein the gemini cationic surfactant is of a quaternary ammonium type.

25. The pharmaceutical composition according to claim 24, wherein the gemini cationic surfactant has a hydrophobic tail comprising a C_3-C_{30} alkyl group, linear or branched, saturated or unsaturated.

26. The pharmaceutical composition according to claim 21 or 25, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, protein, vaccine, immunoglobulin, immunomodulator, oligonucleotide, peptide, hormone, toxin, and enzyme.

27. The pharmaceutical composition according to claim 26, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, and oligonucleotide.

28. The pharmaceutical composition according to claim 27, wherein the biologically active agent is a plasmid DNA comprising the gene encoding for interferon-γ for treatment of scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

29. The pharmaceutical composition according to claim 21 or 27, wherein the skin disorder is selected from the group consisting of scleroderma, atopic dermatitis, psoriasis, conditions characterized by any cytokine deficiency, conditions characterized by IFNγ

deficiency, an epidermal fragility disorder, a keratinization disorder, a hair disorder, a pigmentation disorder, a porphyria, a multisystem disorder, cancer, inherited epidermolysis bullosa; lamellar ichthyosis, X-linked ichthyosis, and xeroderma pigmentosum.

30. The pharmaceutical composition according to claim 29, wherein the skin disorder is selected from scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

31. The pharmaceutical composition according to claim 21 or 27, wherein the metabolic disease is selected from the group consisting of conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, gyrate atrophy, maternal hyperphenylalaninemia, familial hypercholesterolemia, and phenylketonuria.

32. The pharmaceutical composition according to claim 21 or 27, wherein the pharmaceutical composition is in the form of a cream, lotion, paste, ointment, foam, gel, lipid formulation, emulsion, or suspension, or a liquid formulated as an aqueous solution, non-aqueous solution, aerosol, mist, spray, drops, or instillation, or as a coating on, or filler in, a dressing, packing, film, mesh or transdermal patch.

33. The pharmaceutical composition according to claim 21, wherein the one or more supplements are selected from a neutral carrier or a permeation enhancer.

34. The pharmaceutical composition according to claim 33, wherein the neutral carrier is selected from dioleyl phosphatidylethanolamine or cholesterol.

35. The pharmaceutical composition according to claim 33, wherein the permeation enhancer is selected from ethanol, salicylic acid, diethylene glycol monoethyl ether, propylene glycol, oleic acid, a terpene, a surfactant, a fatty acid, a fatty acid ester, azone, an azone derivative, an amide, dimethylformamide, or a sulfoxide.

36. The pharmaceutical composition according to claim 21, wherein the pharmaceutical composition further comprises one or more surfactants, co-surfactants, or oily phase components suitable for application to the skin or mucosal membrane.

37. The pharmaceutical composition according to claim 36, wherein the surfactant is selected from the group consisting of PEG-8 caprylic and capric glycerids.

38. The pharmaceutical composition according to claim 36, wherein the co-surfactant is selected from the group consisting of polyglyceryl 3- diisostearate, polyglyceryl-6 isostearate, polyglycerol-3-isosterate and polyglyceryl-6 dioleate.

39. The pharmaceutical composition according to claim 36, wherein the oily phase component is selected from the group consisting of propylene glycol monocaprylate, oleoyl macrogol-6 glycerides, PEG-8 glyceryl linoleate, propylene glycol laurate, propylene glycol monolaurate, and octyldodecyl myristate.

40. A method of treating skin disorders and metabolic diseases comprising:

contacting the skin or mucosal membrane of a subject with a delivery system comprising a gemini surfactant in admixture with a biologically active agent in a topical formulation, wherein the delivery system, when in contact with the skin or mucosal membrane, releases the biologically active agent in a therapeutically-effective amount to provide a localized or systemic effect for treatment of a skin disorder or a metabolic disease.

41. The method according to claïm 40, wherein the gemini surfactant is selected from an anionic gemini surfactant, a gemini cationic surfactant, a neutral gemini surfactant, an amphoteric gemini surfactant, or mixtures thereof.

42. The method according to claim 41, wherein the gemini surfactant is a gemini cationic surfactant.

43. The method according to claim 42, wherein the gemini cationic surfactant is of a quaternary ammonium type.

44. The method according to claim 43, wherein the gemini cationic surfactant has a hydrophobic tail comprising a C_3-C_{30} alkyl group, linear or branched, saturated or unsaturated.

45. The method according to claim 40 or 44, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, protein, vaccine, immunoglobulin, immunomodulator, oligonucleotide, peptide, hormone, toxin, and enzyme.

46. The method according to claim 45, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, and oligonucleotide.

47. The method according to claim 46, wherein the biologically active agent is a plasmid DNA comprising the gene encoding for interferon-γ for treatment of scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

48. The method according to claim 40 or 46, wherein the skin disorder is selected from

the group consisting of scleroderma, atopic dermatitis, psoriasis, conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, an epidermal fragility disorder, a keratinization disorder, a hair disorder, a pigmentation disorder, a porphyria, a multisystem disorder, cancer, inherited epidermolysis bullosa; lamellar ichthyosis, X-linked ichthyosis, and xeroderma pigmentosum.

49. The method according to claim 48, wherein the skin disorder is selected from scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

50. The method according to claim 40 or 46, wherein the metabolic disease is selected from the group consisting of conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, gyrate atrophy, maternal hyperphenylalaninemia, familial hypercholesterolemia, and phenylketonuria.

51. The method according to claim 40 or 46, wherein the delivery system is provided in as a coating on, or filler in, a dressing, packing, film, mesh or transdermal patch, or in a pharmaceutical composition with one or more pharmaceutically acceptable carriers, diluents, excipients, or supplements suitable for application to the skin or mucosal membrane.

52. The method according to claim 51, wherein the pharmaceutical composition is in the form of a cream, lotion, paste, ointment, foam, gel, lipid formulation, emulsion, or suspension, or a liquid formulated as an aqueous solution, non-aqueous solution, aerosol, mist, spray, drops, or instillation.

53. The method according to claim 52, wherein the one or more supplements are selected from a neutral carrier or a permeation enhancer.

54. The method according to claim 53, wherein the neutral carrier is selected from dioleyl phosphatidylethanolamine or cholesterol.

55. The method according to claim 53, wherein the permeation enhancer is selected from ethanol, salicylic acid, diethylene glycol monoethyl ether, propylene glycol, oleic acid, a terpene, a surfactant, a fatty acid, a fatty acid ester, azone, an azone derivative, an amide, dimethylformamide, or a sulfoxide.

56. The method according to claim 51, wherein the pharmaceutical composition further comprises one or more surfactants, co-surfactants, or oily phase components suitable for application to the skin or mucosal membrane.

57. The method according to claim 56, wherein the surfactant is selected from the group

consisting of PEG-8 caprylic and capric glycerids.

58. The method according to claim 56, wherein the co-surfactant is selected from the group consisting of polyglyceryl 3- diisostearate, polyglyceryl-6 isostearate, polyglycerol-3-isosterate and polyglyceryl-6 dioleate.

59. The method according to claim 56, wherein the oily phase component is selected from the group consisting of propylene glycol monocaprylate, oleoyl macrogol-6 glycerides, PEG-8 glyceryl linoleate, propylene glycol laurate, propylene glycol monolaurate, and octyldodecyl myristate.

60. Use of a delivery system in the treatment of a skin disorder or metabolic disease, wherein the delivery system comprises a gemini surfactant in admixture with a biologically active agent in a topical formulation, and the delivery system, when in contact with the skin or mucosal membrane, releases the biologically active agent in a therapeutically effective amount to provide a localized or systemic effect.

61. The use according to claim 60, wherein the gemini surfactant is selected from an anionic gemini surfactant, a gemini cationic surfactant, a neutral gemini surfactant, an amphoteric gemini surfactant, or mixtures thereof.

62. The use according to claim 61, wherein the gemini surfactant is a gemini cationic surfactant.

63. The use according to claim 62, wherein the gemini cationic surfactant is of a quaternary ammonium type.

64. The use according to claim 63, wherein the gemini cationic surfactant has a hydrophobic tail comprising a C_3-C_{30} alkyl group, linear or branched, saturated or unsaturated.

65. The use according to claim 60 or 64, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, protein, vaccine, immunoglobulin, immunomodulator, oligonucleotide, peptide, hormone, toxin, and enzyme.

66. The use according to claim 65, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, and oligonucleotide.

67. The use according to claim 66, wherein the biologically active agent is a plasmid DNA comprising the gene encoding for interferon-γ for treatment of scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

68. The use according to claim 60 or 66, wherein the skin disorder is selected from the group consisting of scleroderma, atopic dermatitis, psoriasis, conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, an epidermal fragility disorder, a keratinization disorder, a hair disorder, a pigmentation disorder, a porphyria, a multisystem disorder, cancer, inherited epidermolysis bullosa; lamellar ichthyosis, X-linked ichthyosis, and xeroderma pigmentosum.

69. The use according to claim 68, wherein the skin disorder is selected from scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

70. The use according to claim 60 or 66, wherein the metabolic disease is selected from the group consisting of conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, gyrate atrophy, maternal hyperphenylalaninemia, familial hypercholesterolemia, and phenylketonuria.

71. The use according to claim 60 or 66, wherein the delivery system is provided in as a coating on, or filler in, a dressing, packing, film, mesh or transdermal patch, or in a pharmaceutical composition with one or more pharmaceutically acceptable carriers, diluents, excipients, or supplements suitable for application to the skin or mucosal membrane.

72. The use according to claim 71, wherein the pharmaceutical composition is in the form of a cream, lotion, paste, ointment, foam, gel, lipid formulation, emulsion, or suspension, or a liquid formulated as an aqueous solution, non-aqueous solution, aerosol, mist, spray, drops, or instillation.

73. The use according to claim 72, wherein the one or more supplements are selected from a neutral carrier or a permeation enhancer.

74. The use according to claim 73, wherein the neutral carrier is selected from dioleyl phosphatidylethanolamine or cholesterol.

75. The use according to claim 73, wherein the permeation enhancer is selected from ethanol, salicylic acid, diethylene glycol monoethyl ether, propylene glycol, oleic acid, a terpene, a surfactant, a fatty acid, a fatty acid ester, azone, an azone derivative, an amide, dimethylformamide, or a sulfoxide.

76. The use according to claim 71, wherein the pharmaceutical composition further comprises one or more surfactants, co-surfactants, or oily phase components suitable for application to the skin or mucosal membrane.

77. The use according to claim 76, wherein the surfactant is selected from the group consisting of PEG-8 caprylic and capric glycerids.

78. The use according to claim 76, wherein the co-surfactant is selected from the group consisting of polyglyceryl 3- diisostearate, polyglyceryl-6 isostearate, polyglycerol-3-isosterate and polyglyceryl-6 dioleate.

79. The use according to claim 76, wherein the oily phase component is selected from the group consisting of propylene glycol monocaprylate, oleoyl macrogol-6 glycerides, PEG-8 glyceryl linoleate, propylene glycol laurate, propylene glycol monolaurate, and octyldodecyl myristate.

80. Use of a gemini surfactant in the manufacture of a delivery system with a biologically active agent in a topical formulation for treatment of a skin disorder or metabolic disease.

81. The use according to claim 80, wherein the gemini surfactant is selected from an anionic gemini surfactant, a gemini cationic surfactant, a neutral gemini surfactant, an amphoteric gemini surfactant, or mixtures thereof.

82. The use according to claim 81, wherein the gemini surfactant is a gemini cationic surfactant.

83. The use according to claim 82, wherein the gemini cationic surfactant is of a quaternary ammonium type.

84. The use according to claim 83, wherein the gemini cationic surfactant has a hydrophobic tail comprising a C_3-C_{30} alkyl group, linear or branched, saturated or unsaturated.

85. The use according to claim 80 or 84, wherein the gemini surfactant is admixed in the topical formulation with the biologically active agent selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, protein, vaccine, immunoglobulin, immunomodulator, oligonucleotide, peptide, hormone, toxin, and enzyme.

86. The use according to claim 85, wherein the biologically active agent is selected from the group consisting of a nucleic acid, plasmid DNA, DNA vaccine, and oligonucleotide.

87. The use according to claim 86, wherein the biologically active agent is a plasmid DNA comprising the gene encoding for interferon-γ for treatment of scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

88. The use according to claim 80 or 86, wherein the skin disorder is selected from the

group consisting of scleroderma, atopic dermatitis, psoriasis, conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, an epidermal fragility disorder, a keratinization disorder, a hair disorder, a pigmentation disorder, a porphyria, a multisystem disorder, cancer, inherited epidermolysis bullosa; lamellar ichthyosis, X-linked ichthyosis, and xeroderma pigmentosum.

89. The use according to claim 88, wherein the skin disorder is selected from scleroderma, atopic dermatitis, or any condition characterized by interferon-γ deficiency.

90. The use according to claim 80 or 86, wherein the metabolic disease is selected from the group consisting of conditions characterized by any cytokine deficiency, conditions characterized by IFNγ deficiency, gyrate atrophy, maternal hyperphenylalaninemia, familial hypercholesterolemia, and phenylketonuria.

91. The use according to claim 80 or 86, wherein the topical formulation is in the form of a cream, lotion, paste, ointment, foam, gel, lipid formulation, emulsion, or suspension, or a liquid formulated as an aqueous solution, non-aqueous solution, aerosol, mist, spray, drops, or instillation, or as a coating on, or filler in, a dressing, packing, film, mesh or transdermal patch.

92. The use according to claim 91, wherein the topical formulation comprises one or more pharmaceutically acceptable carriers, diluents, excipients, or supplements suitable for application to the skin or mucosal membrane.

93. The use according to claim 92, wherein the one or more supplements are selected from a neutral carrier or a permeation enhancer.

94. The use according to claim 93, wherein the neutral carrier is selected from dioleyl phosphatidylethanolamine or cholesterol.

95. The use according to claim 93, wherein the permeation enhancer is selected from ethanol, salicylic acid, diethylene glycol monoethyl ether, propylene glycol, oleic acid, a terpene, a surfactant, a fatty acid, a fatty acid ester, azone, an azone derivative, an amide, dimethylformamide, or a sulfoxide.

96. The use according to claim 92, wherein the topical formulation further comprises one or more surfactants, co-surfactants, or oily phase components suitable for application to the skin or mucosal membrane.

97. The use according to claim 96, wherein the surfactant is selected from the group

consisting of PEG-8 caprylic and capric glycerids.

98. The use according to claim 96, wherein the co-surfactant is selected from the group consisting of polyglyceryl 3- diisostearate, polyglyceryl-6 isostearate, polyglycerol-3-isosterate and polyglyceryl-6 dioleate.

99. The use according to claim 96, wherein the oily phase component is selected from the group consisting of propylene glycol monocaprylate, oleoyl macrogol-6 glycerides, PEG-8 glyceryl linoleate, propylene glycol laurate, propylene glycol monolaurate, and octyldodecyl myristate.